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Devereaux et al.

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(54) **WIRELESS AUGMENTED REALITY COMMUNICATION SYSTEM**

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Related U.S. Application Data

(63) Continuation of application No. 14/595,191, filed on Jan. 12, 2015, now Pat. No. 9,479,726, which is a continuation of application No. 14/187,315, filed on Feb. 23, 2014, now Pat. No. 8,933,863, which is a continuation of application No. 14/038,760, filed on Sep. 27, 2013, now Pat. No. 8,736,517, which is a continuation of application No. 13/723,472, filed on Dec. 21, 2012, now Pat. No. 8,633,869, which is a continuation of application No. 12/698,107, filed on Feb. 1, 2010, now abandoned, which is a continuation of application No. 11/410,517, filed on Apr. 24, 2006, now abandoned, which is a continuation of application No. 09/483,315, filed on Jan. 14, 2000, now Pat. No. 7,035,897.

(60) Provisional application No. 60/115,993, filed on Jan. 15, 1999.

(51) **Int. Cl.**

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G06T 19/00	(2011.01)
H04W 76/02	(2009.01)
H04L 29/06	(2006.01)

(52) **U.S. Cl.**

CPC ***H04N 7/147*** (2013.01); ***G06T 19/006*** (2013.01); ***H04L 65/1069*** (2013.01); ***H04W 76/02*** (2013.01)

(58) **Field of Classification Search**

CPC H04N 7/147; G06T 19/006

See application file for complete search history.

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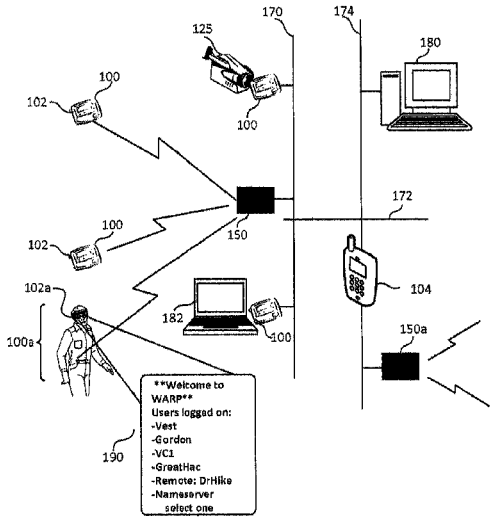
(57) **ABSTRACT**

A portable unit is for video communication to select a user name in a user name network. A transceiver wirelessly accesses a communication network through a wireless connection to a general purpose node coupled to the communication network. A user interface can receive user input to log on to a user name network through the communication network. The user name network has a plurality of user names, at least one of the plurality of user names is associated with a remote portable unit, logged on to the user name network and available for video communication.

20 Claims, 3 Drawing Sheets



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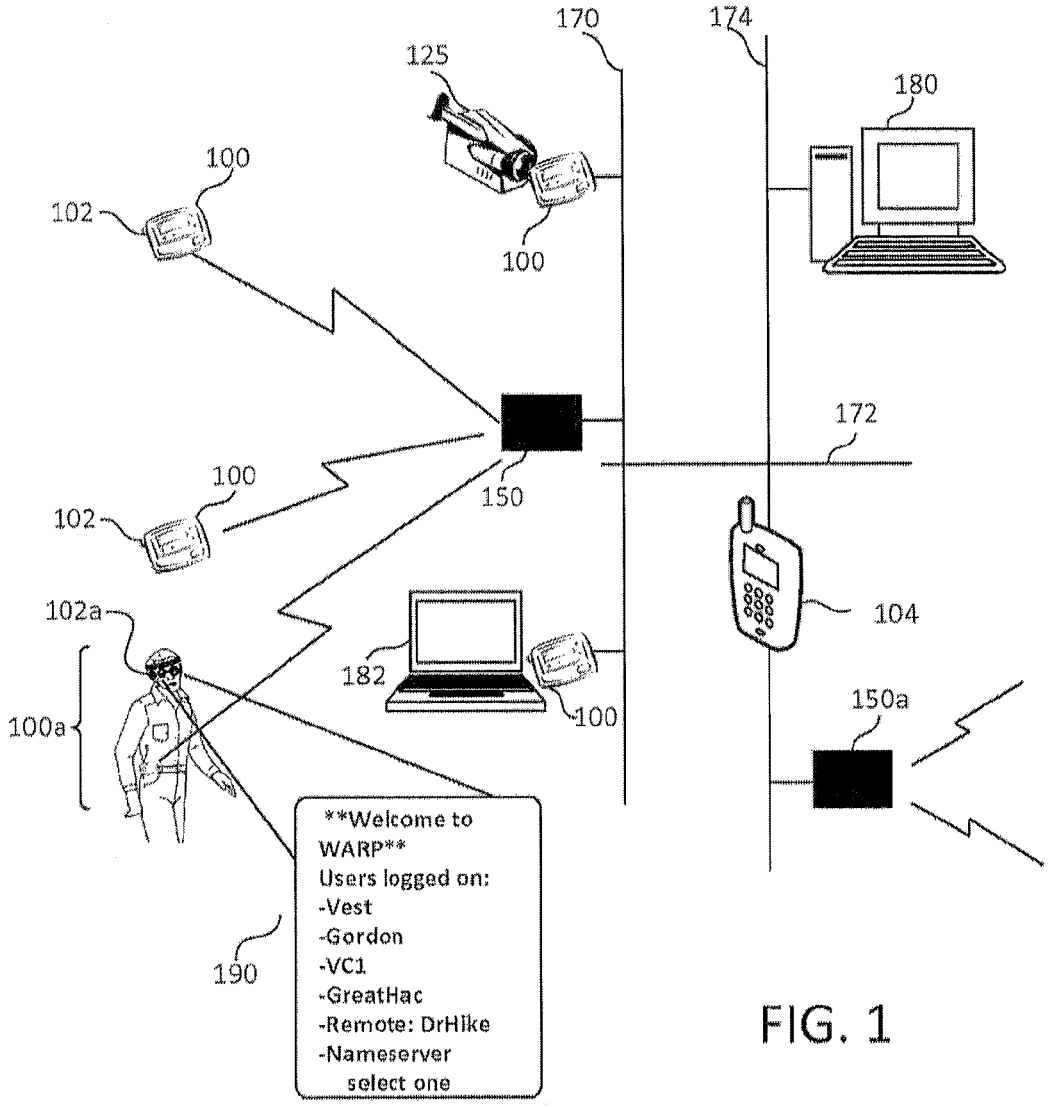
170
174
125
180
100
102
100
172
150
100
102
104
102a
182
100
150a
100a
Welcome to WARP
Users logged on:
-Vest
-Gordon
-VC1
-GreatHac
-Remote: DrHike
-Nameserver
select one
190

FIG. 1

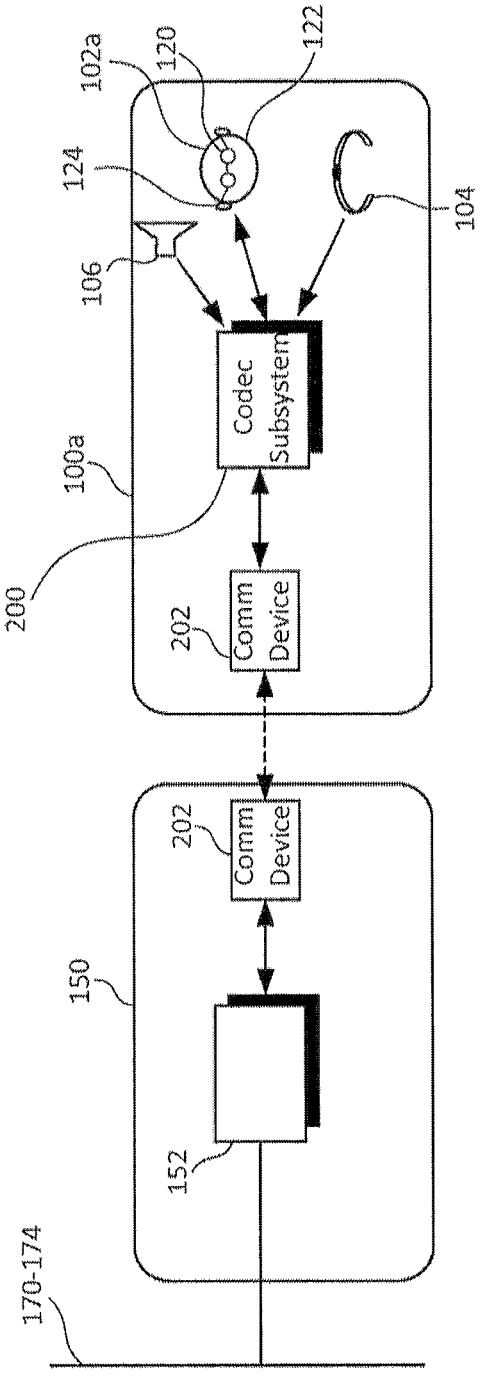
102a
120
122
124
104
106
Codec Subsystem
100a
200
202
Comm Device
202
Comm Device
150
152
170-174

FIG. 2

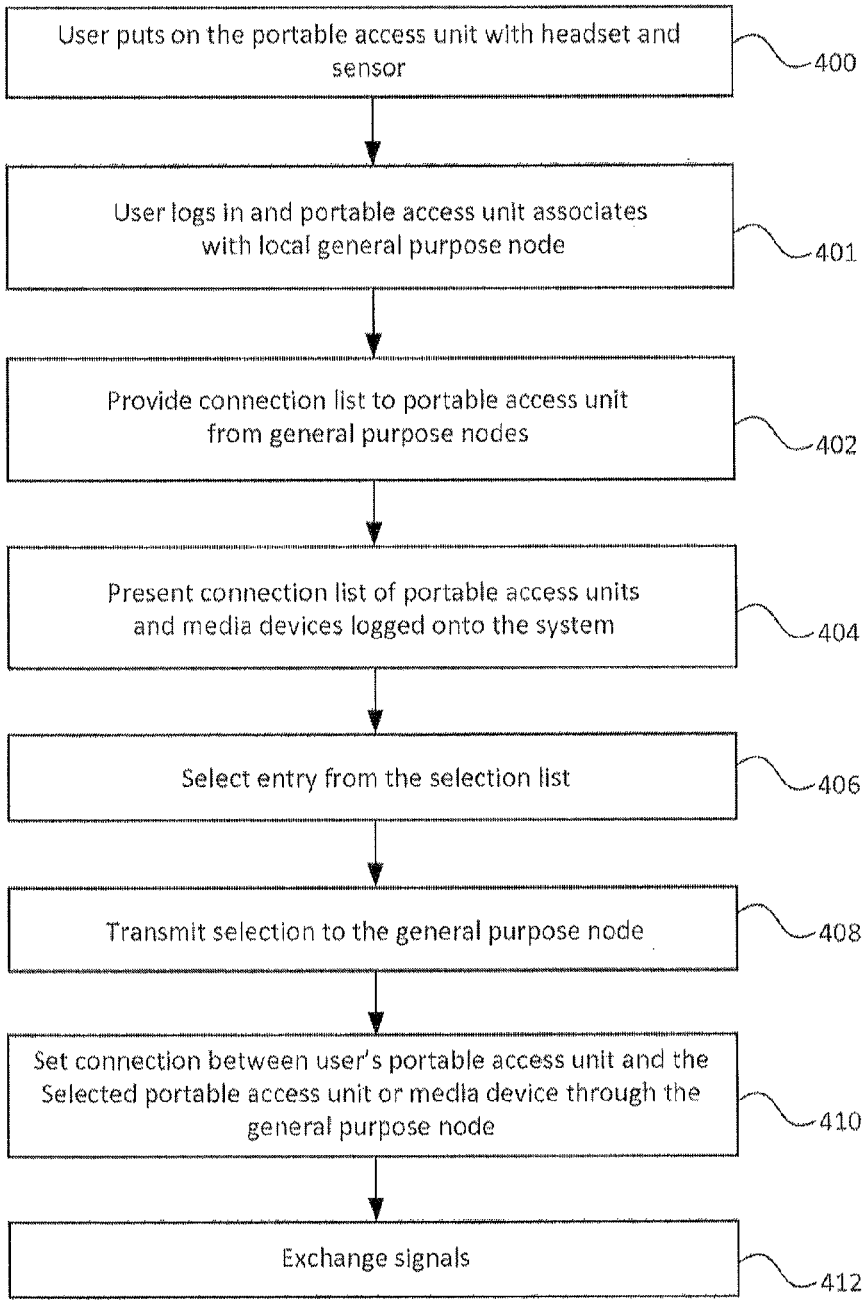
User puts on the portable access unit with headset and sensor
400
User logs in and portable access unit associates with local general purpose node
401
Provide connection list to portable access unit from general purpose nodes
402
Present connection list of portable access units and media devices logged onto the system
404
Select entry from the selection list
406
Transmit selection to the general purpose node
408
Set connection between user's portable access unit and the Selected portable access unit or media device through the general purpose node
410
Exchange signals
412

FIG. 3

WIRELESS AUGMENTED REALITY COMMUNICATION SYSTEM

GOVERNMENT LICENSE RIGHTS

The U.S. Government has certain rights in this invention pursuant to NAS7-1407 awarded by NASA.

CROSS-REFERENCE TO RELATED APPLICATIONS

Any and all applications for which a foreign or domestic priority claim is identified in the Application Data Sheet as filed with the present application are hereby incorporated by reference under 37 CFR 1.57.

FIELD OF THE INVENTION

The invention, in general, relates to a wireless augmented reality system (WARS), and more particularly, to a WARS that leverages communications and multimedia information processing microelectronics, along with displays, imaging sensors, biosensors, and voice recognition to provide hands-free, tetherless, real-time access and display of network resources, including video, audio and data.

DESCRIPTION OF RELATED INFORMATION

Online instruction manuals are becoming more prevalent in the industrial and everyday environment. These electronic technical manuals (ETM) may be interactive. Just as with printed manuals, ETMs may become very difficult to use and maintain in these environments where elements of an environment, such as dust, chemical or general harshness may be detrimental to the electronics and storage devices used to display and operate the ETM. Further, it is not always possible for a worker who requires access to an ETM to stop work to consult ETM.

These problems are multiplied in extraterrestrial environments such as a space shuttle or a space station. During intra and extra vehicular activities, it may be virtually impossible to access a traditional keyboard and computer display to access an ETM. For example, during a satellite repair mission, it would not be practical for an astronaut in a bulky extravehicular space suit to type commands on a keyboard to view a display in the extreme environment of outer space where the sun glare may make viewing impossible.

Hands-free portable computers have been implemented in an attempt to solve some of these problems. For example, U.S. Pat. Nos. 5,305,244 and 5,844,824 describe systems in which a head-up display and voice recognition is implemented in a portable computer for displaying ETM. However, these systems, being a single user-to-computer paradigm, do not allow multiple-user access to multiple computers, multimedia devices or nodes on a network for accessing arbitrarily-selected data channels. Further, these previously-described systems are self contained and their data storage needs to be updated periodically to be sure that the latest data is displayed. Further, these systems do not allow two-way communication over local and wide area networks to other multi-media users and devices, and do not provide real-time biomedical information about the physical condition of the user.

There is thus a need for a wireless, wearable communications system allowing two-way voice, video and data communication between local users and to remote users and devices over network-nodes, along with tetherless real-time monitoring of the local user's physical condition.

SUMMARY

The needs of the prior art are met by a portable unit, methods of software for video communication to select a user name in a user name network.

In one embodiment, a transceiver wirelessly accesses a communication network through a wireless connection to a general purpose node coupled to the communication network. A user interface can receive user input to log on to a user name network through the communication network. The user name network has a plurality of user names, at least one of the plurality of user names being associated with a remote portable unit, logged on to the user name network and available for video communication. In some embodiments, the user interface comprises a touchpad configured to receive user inputs. A display on the portable unit displays one or more of the plurality of user names.

In an embodiment, the user interface further receives a selection of a user name from the plurality of user names. The display displays video communication received by the portable unit from the remote portable unit. The video communication is associated with the selected user name.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagrammatic illustration of the components of the system of the present invention;

FIG. **2** is block diagram illustrating communications components used by the personal access unit and general purpose node of the system of FIG. **1**; and

FIG. **3** is a flowchart illustrating a method performed using the system of FIG. **1**.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

With reference to FIG. **1**, a diagram illustrating components of the system of the present invention is shown. The system may comprise small pager-like devices called portable access units **100**. The portable access units **100** are accessorizable for different "multimedia" interfaces for display, camera, audio and sensor operation. Another embodiment of the portable access unit **100***a* comprises a wearable headset and microphone assembly **102***a*.

The portable access units **100-100***a* interface directly through wireless link with a network through a general purpose node **150**. The general purpose node **150** allows wireless-to-wire communication with a local network **170**. The local area network **170** may be electrically connected to a wide area network or Internet **172** in order to connect to remote local area networks **174**. Alternatively, the general purpose node **150** may be directly connected to the wide area network **172**. The general purpose node **150** may thus act as a router for routing video, display, audio and control data packets between the portable access units **100** and other, or remote, portable access units **100** or remote media devices **125**, **180**, etc connected to the networks **170-174**. The connection with a network **170-174** may occur directly in electrical connection with one of the networks **170-174**, or in wireless communication through a remote general purpose node **150***a* that is electrically connected to the network. The portable access units **100** may provide communication to and from remote media devices comprising computers **180-182** running specialized client software or certain com-

mercial multimedia Internet software products such as video conferencing products that adhere to the industry standard H.323 for multimedia data transfer.

Each portable access unit **100-100***a* may dynamically associate with the closest general purpose node **150-150***a* when it is logged on to the network **170-174** or is connected thereto. Each general purpose node **150-150***a* records the associations and registers each portable access unit **100-100***a* on a list of connections associated with the particular general purpose node **150-150***a*. The list of connections is stored in a random access memory device included in the general purpose node **150-150***a*. When a portable access unit **100** is logged off or disconnected from the network **170-174**, it is disassociated from the particular general purpose node **150-150***a* that it was associated with, and thus, is removed from the list of connections.

As shown on an example selection list screen **190** that may be presented on a display **102** or headset **102***a* on any of the portable access units **100-100***a*, the user can set up a video, audio, or data link with any other portable access unit **100-100***a* or remote media device **125**, **180**, etc, that is logged onto a network **170-174**. The headset **102***a* may comprise a heads-up display (**120** in FIG. **2**) inside a headset embodying a transparent color LCD device. Using control keys or voice commands, a user of the portable access unit **100-100***a* may select a local or remote portable access unit **100-100***a* on a selection list **190** of other portable access units **100-100***a* or media devices **125**, **180**. The selection list **190** comprises a combination of the lists of connections stored on all of the general purpose nodes **150-150***a*. Users may further access a nameserver located on the access node **150** for locating remote unfamiliar portable access units **100-100***a* or remote media devices.

By selecting entries from the selection list **190**, users may communicate with portable access units **100-100***a* or various media devices such as cameras **125**, internet phones **104**, one or more computers **180-182** located throughout the networks **170-174**. A user may further select from the list **190** user names representing users of other portable access units **100** that are logged in and associated with remote general purpose nodes **150***a* connected to the networks **170-174**.

With reference to FIG. **2**, the components of the access node **150** and the wearable headset embodiment of the portable access unit **100***a* is shown. Elements for both the general purpose access node and portable access unit **100***a* include a communications device **202**. Data processing functions are implemented in the form of an audio/video coder/decoder (codec) pair **200**, one codec **200** comprising part of the portable access unit **100***a* and the other codec **200** being part of another portable access node **100***a* or remote media device for which it is desired to exchange signals. At a portable access node, the codec **200** controls a digital data stream which is fed to the communications device **202**, which is implemented as an RF modem transceiver pair with an equivalent communications device **202** located in the general purpose access node. The codecs **200** serve as the interfaces to the external elements (including possibly the user display **102***a* and the sensor **104**) on both sides of the communication continuum comprising the communications device **202** of the general purpose node **150**, an internal network interface protocol circuit **152**, the external networks **170-174** and the electrical connection or general purpose access node connection to the desired remote portable access node or media device. The internal network interface protocol circuit **152** may comprise an Ethernet chip, memory and a network protocol chip. With this architecture, the system addresses the issues of multiple-access and data channel quality, through the implementation of the communications device **202**. Multiple implementations of the communication device **202** in the general purpose node **150** allows for multiple simultaneous communication links with a plurality of portable access units **100-100***a* for the general purpose node **150**.

With the base functionality of the communications device **202** and codec subsystem **200**, the architecture provides flexibility in utilization of different external components such as different headset **102***a* configurations, sensor **104** packages, and network interface **152** capabilities.

The communication device **202** is designed to operate in a high multipath space station or terrestrial indoor environment while being able to support multiple users at high, multimedia-type bandwidths. Thus the communications device's **202** physical (PHY) and media access (MAC) layers in combination support multiple access, dynamic network association, channel error rates of broadcast video quality (1.times.10e-6), and data rates up to broadcast-quality video bandwidths (on the order of 768 kbps per user (one-way)). Modulation to achieve this performance will be differential phase-shift keying, of binary or higher order (quadrature or high-order quadrature amplitude modulation); the order chosen reflects the necessary user data volume to be supported within fixed, FCC-specified bandwidth allocations. Orthogonal frequency division multiplexing, code division multiple access, and frequency hopping/time division multiple access may be used for achieving multiple access. Spread spectrum, channel equalization, antenna diversity and retransmission techniques may also be used for improving the reliability of the communications link. Through a combination of these technologies, two-way multimedia channel throughputs can be achieved for each of multiple simultaneous users. A variety of RF frequencies may be used, but the determining factor in frequency band selection is the availability in the band of a relatively large amount of spectrum in the space station or FCC terrestrial allocations, allowing the transmission of compressed video. Ranges in the 2.5 to 5.7 band range are preferable due to the FCC bandwidth available, the compactness of RF elements required at these frequencies, and the potentially low amount of interference that will be sustained. The RF front end of both the portable access unit **100-100***a* and general purpose node **150-150***a* may be interchangeable with different frequency front ends for system use in different frequency bands.

Low-rate, single user implementations of the communications system may be effected through adapted commercial wireless-LAN type products following the FCC 802.11 standard such as a frequency-hopping 2.4 GHz wireless LAN transceiver by Waveaccess, Inc of Wellesley, Mass., or direct-sequence spread-spectrum 2.4 GHz wireless LAN chipset by Harris Prism of Melbourne, Fla. These radio implementations, as with commercial implementations of the industry-proposed Bluetooth and HomeRF standards, will be limited in user access and overall throughput, however, and therefore unsuitable to real-time video teleconferencing for multiple users. The preferred embodiment for full capability is to implement the communications devices' physical and media access control layers in custom ASIC circuits allowing for support of all system capabilities within microelectronics architecture for small size and low power draw, providing pager-type form factor of wearable personal access units **100-100***a*.

The communications device **202** comprises a buffer memory and a radio frequency front end. Data modulation/

demodulation circuits and error detection/correction protocol circuits are further included. Various combinations of these circuits may be obtained from Proxim of Sunnyvale, Calif., Harris of Melbourne, Fla. and Stanford Telecom of Stanford, Calif. Alternatively, all of the various circuitry may be implemented with an application specific integrated circuit (ASIC), or a combination of an ASIC and discrete elements for size and weight efficiency.

Three classes of headsets **102***a* may be used: hi-resolution military systems which are CRT based and may be provided by Honeywell of Morristown, N.J., or Hughes Network Systems of San Diego, Calif.; medium resolution industrial systems which are CRT or LED based scanners and may be provided by Intervision of Santa Clara, Calif.; or low to medium resolution entertainment systems which are color viewfinder LCD based systems that may be supplied by Virtual Vision of Redmond, Wash. (the V-CAP and E-GLASS), Sony Europe of Hampshire, United Kingdom (GLASSTRON VISOR) or Olympus of San Jose, Calif. Typical headset display **120** specifications for the portable access unit **100***a* include the following:

RESOLUTION: Comparable at least to VGA (640×480) or better to 1280×1024 w/off-the-shelf display & I/O configuration

DISPLAY: >10 FL/day, Display Bright.Ratio: >2, Brightness range: 2 OOM_{max}

FOV: 40-60 deg, Gray scale: >12

EyeRelief: 20-26 mm TSP, 14/10 mm (on/off-axis) exit pupil

Unif: 2:1 across ⅔ FOV, GLARE: <2.5% image content, PixelContrast: 25

FOCUS: Hands off, Obs: % look-around, Diopter range: .+−.2,

Mag: 1±p5%, Cont: >95%, motion sensor 10° cone, Inter. Eye. adj: 52-72 mm

Image Enhan & IFF: Weaponsight, motion sensor and computer interface

The audio/video codec **200** in a portable access unit **100-100***a* or other client device is based around a single chip, standards-based codec that accepts analog or digital audio and video (i.e. NTSC or VGA) compresses this input, and multiplexes the compressed data with an external data stream. The preferred industry standards are: ITU H.263 based video, ITU G.722 based audio, and ITU H.221 based multiplexing. The audio video codec **200** in the portable access unit **100-100***a* can establish a link with a similar audio/video codec **200** associated with another portable access unit **100-100***a* or a remote media device **104**, **125**, **180** or **182**. The signals from the codec **200** in the portable access unit **100***a* outputs the received and decompressed remote signals from the device for which the link was established. The interface between the codec **200** and communication device **202** as well as between the communication devices **202** of the general purpose node **150-150***a* and portable access unit **100-100***a* operate two-way with a high bandwidth suitable for transmitting video. Of this bandwidth, the audio portion utilizes up to 64 kbps and the data from the sensor **104** utilizes the required amount for the type of sensor **104**, with the remainder allocated to compressed video. The quality of the video at these data rates in excess of 128 kbps is at least equivalent to video teleconferencing quality video.

The audio/video codec **200** portion of the portable access unit **100-100***a* may further comprise video input and output ports, audio input and output ports, data input and output ports, and a the above-mentioned multimedia processor chip for packaging signals for data compression and decompression for transmission. Exemplary multimedia processors include the VCPEX chip by 8.times.8, Inc. of Santa Clara, Calif. or digital signal processing chips by Texas Instruments and others. The audio/video codec **200** further comprises a field processor gate array, electrically programmable read-only memory and random access memory for processing and packaging signals for compression and decompression.

The sensor **104** may comprise a commercially available pulse oximeter sensor or other type of bio-sensor. A pulse-oximeter sensor allows the measurement of pulse rate and oxygen saturation of the blood. Data from the sensor **104** is transmitted to the general purpose node **150-150***a*, and transmitted to any remote media device connected to any of the networks **170-172**. The sensor **104** may comprise an "on body" wireless human performance and fatigue monitoring system that communicates with a belt-mounted transceiver/control module. The remote media device may comprise a processor **180-182** for display or logging of the real-time sensor signals.

The headset **102***a* comprises a heads-up display **120** comprising a transparent color LCD device for video signals received and processed by the codec **200**. The headset **102***a* may further comprise, or have attached thereto, an integrated microphone **122** for receiving voice commands from the user of the portable access unit **100***a* or for communicating voice signals to a remote portable access unit **100** or remote media device. The headset may further comprise a speaker **124** or earpiece unit for presenting audio signals to the user. The portable access unit **100***a* may further comprise a digital camera **106** that may either be attached on the user's person, or to the headset **102***a* for providing video signals to other portable access units **100-100***a* or media devices.

With reference to FIG. **3**, a flow diagram illustrating the method performed by the system of FIG. **1** is shown. A user puts on the headset **102***a*, portable access unit **100***a*, step **400**. The user may log into the local general purpose node **150** wherein the portable access unit associates with the general purpose node **150** such that the user is added to a connection list stored in a random access memory device residing in the general purpose node **150**, step **401**. Data is provided from the general purpose node **150** to the portable access unit through the communication devices **202**, step **402**. The user is presented with a selection list **190** of portable access units **100-100***a* and media devices logged onto the system on the display **120**, step **404**. The user selects one of the entries from the selection list, step **406**. The selection is transmitted to the general purpose node **150**, step **408**. The general purpose node **150** sets up a connection over the networks **170-174** for channeling data between the portable access unit **100***a* and the selected network device, step **410**. The selected network device may comprise the processor **180** or other network client **182** for running a software application, a camera **125** for providing remote viewing operations to the user on the display **120**, the Internet phone **104** for providing voice communications with the a remote user, or another portable access unit **100-100***a* over a remote general purpose node **150***a*. By providing control commands to the microphone **122** or other input system, such as a keyboard or handheld mouse, the user may conduct operations by transmitting commands between the portable access unit **100***a* and the general purpose node **150** which routs the control commands to the device that the user selected, step **412**.

It will thus be seen that changes may be made in carrying out the above system and method and in the construction set forth without departing from the spirit and scope of the

invention, it is intended that any and all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A system for communication between remote devices, the system comprising:

a network device connected to a communication network; and

a memory associated with the network device and configured to maintain and update a connection list of wireless communication devices that are currently connected to the communication network and ready for two-way communication with another networked device such that the connection list is updated to add a new device when the new device is logged on to the communication network and that the connection list is updated to remove an existing device when the existing device is logged off from the communication network,

wherein, in response to logon to the communication network by a first wireless device associated with a first user name, the network device is configured to communicate with the first wireless device to cause to display, on an integrated display of the first wireless device, user names to select from for two-way communication via the communication network and further to cause the user names to be updated based on the connection list such that when a second wireless device corresponding to a second one of the displayed user names is logged off from the communication network, the second user name is no longer displayed on the integrated display of the first wireless device,

wherein, in response to selection of a third user name from the displayed user names, the network device is configured to coordinate establishing a wireless communication channel for video communication between the first wireless device and a third wireless device corresponding to the third user name.

2. The system of claim **1**, wherein, in response to connection to the communication network by the first wireless device comprising an integrated camera, the integrated display and an integrated touch input device, the network device is configured to cause the memory to add the first wireless device to the connection list.

3. The system of claim **1**, wherein, in response to disconnection from the communication network by the first wireless device comprising an integrated camera, the integrated display and an integrated touch input device, the network device is configured to cause the memory to remove the first wireless device from the connection list.

4. The system of claim **1**, wherein the first wireless device comprises an integrated microphone configured to capture audio signals to be transmitted to the third wireless device, and the third wireless device comprises an integrated speaker configured to receive audio signals transmitted from the first wireless device, such that upon the establishment of the wireless communication channel, the first wireless device is configured to provide real-time access to the audio signals captured by the integrated microphone of the first wireless device to the third user via the integrated speaker of the third wireless device.

5. The system of claim **1**, wherein the first wireless device comprises an integrated speaker configured to present audio signals received from the third wireless device, and the third wireless device comprises an integrated microphone configured to capture audio signals to be transmitted to the first wireless device, such that upon the establishment of the wireless communication channel, the first wireless device is configured to provide real-time access to the audio signals captured by the integrated microphone of the third wireless device to the first user via the integrated speaker of the first wireless device.

6. The system of claim **1**, wherein in response to selection of the third user name from the displayed user names, the first wireless device is configured to transmit the selection to the network device.

7. The system of claim **1**, wherein the third wireless device comprises a processor configured to execute a video communication software application configured to provide real-time access to video signals captured by the third wireless device to the first wireless device.

8. The system of claim **1**, wherein the third wireless device comprises an integrated camera configured to capture video signals to be transmitted to the first wireless device such that upon the establishment of the wireless communication channel, the first wireless device is configured to provide real-time access to the video signals captured by the integrated camera of the third wireless device to the first user via the integrated display of the first wireless device.

9. The system of claim **1**, wherein the first wireless device comprises an integrated camera configured to capture video signals to be transmitted to the third wireless device, and the third wireless device comprises an integrated display configured to display video signals received from the first wireless device, such that upon the establishment of the wireless communication channel, the first wireless device is configured to provide real-time access to the video signals captured by the integrated camera of the first wireless device to the third user via the integrated display of the third wireless device.

10. The system of claim **1**, wherein the first wireless device comprises an integrated input device configured to receive control commands such that upon the establishment of the wireless communication channel, the first wireless device is configured to transmit the control commands received by the integrated input device to the third wireless device to control at least one operation of the third wireless device based on the control commands.

11. The system of claim **1**, wherein the first wireless device comprises a codec configured to encode and decode video data transmitted between the first wireless device and the third wireless device.

12. A system for communication between remote devices, the system comprising:

a network device connected to a communication network; and

a memory associated with the network device and configured to maintain and update a connection list of wireless communication devices that are currently connected to the communication network and ready for two-way communication with another networked device such that the connection list is updated to add a new device when the new device is logged on to the communication network and that the connection list is updated to remove an existing device when the existing device is logged off from the communication network,

wherein, in response to logon to the communication network by a first wireless device associated with a first user name, the network device is configured to communicate with the first wireless device to cause to display, on an integrated display of the first wireless device, user names to select from for two-way communication via the communication network,

wherein, in response to selection of a second user name from the displayed user names, the network device is configured to coordinate establishing a wireless communication channel for video communication between the first wireless device and a second wireless device corresponding to the second user name.

13. The system of claim **12**, wherein the first wireless device comprises an integrated microphone configured to capture audio signals to be transmitted to the second wireless device, and the second wireless device comprises an integrated speaker configured to receive audio signals transmitted from the first wireless device, such that upon the establishment of the wireless communication channel, the first wireless device is configured to provide real-time access to the audio signals captured by the integrated microphone of the first wireless device to the second user via the integrated speaker of the second wireless device.

14. The system of claim **12**, wherein the first wireless device comprises an integrated speaker configured to present audio signals received from the second wireless device, and the second wireless device comprises an integrated microphone configured to capture audio signals to be transmitted to the first wireless device, such that upon the establishment of the wireless communication channel, the first wireless device is configured to provide real-time access to the audio signals captured by the integrated microphone of the second wireless device to the first user via the integrated speaker of the first wireless device.

15. The system of claim **12**, wherein in response to selection of the second user name from the displayed user names, the first wireless device is configured to transmit the selection to the network device.

16. The system of claim **12**, wherein the second wireless device comprises a processor configured to execute a video communication software application configured to provide real-time access to video signals captured by the second wireless device to the first wireless device.

17. The system of claim **12**, wherein the second wireless device comprises an integrated camera configured to capture video signals to be transmitted to the first wireless device such that upon the establishment of the wireless communication channel, the first wireless device is configured to provide real-time access to the video signals captured by the integrated camera of the second wireless device to the first user via the integrated display of the first wireless device.

18. The system of claim **12**, wherein the first wireless device comprises an integrated camera configured to capture video signals to be transmitted to the second wireless device, and the second wireless device comprises an integrated display configured to display video signals received from the first wireless device, such that upon the establishment of the wireless communication channel, the first wireless device is configured to provide real-time access to the video signals captured by the integrated camera of the first wireless device to the second user via the integrated display of the second wireless device.

19. The system of claim **12**, wherein the first wireless device comprises an integrated input device configured to receive control commands such that upon the establishment of the wireless communication channel, the first wireless device is configured to transmit the control commands received by the integrated input device to the second wireless device to control at least one operation of the second wireless device based on the control commands.

20. The system of claim **12**, wherein the first wireless device comprises a codec configured to encode and decode video data transmitted between the first wireless device and the second wireless device.

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